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(54) TREATING AGENT FOR EXHAUST METAL HALIDE GAS AND TREATING METHOD THEREFOR

(57)Abstract:

PROBLEM TO BE SOLVED: To efficiently and safely treat an exhaust gas containing a metal halide gas by composing a treating agent mainly of a solid metallic oxide and at the same time, making the exhaust gas containing the metal halide gas pass through the solid metallic oxide.

SOLUTION: For a solid metallic oxide to be used as a main component of the treating agent, almost all kinds of metallic element oxides can be used. Especially MgO, CaO, TiO2 and others are preferable because of their low toxicity, case of handling and low cost. An exhaust gas containing a metal halide gas is treated by making the exhaust gas pass through a filling layer containing at least 10 wt.% or more, preferably 50 wt.% or more solid metallic oxide as the main component. In this case, it is preferable to set the specific surface area of the solid metallic oxide at 0.1 m2/g or more from the viewpoint of improving the gas/solid contact between the solid metallic oxide and the exhaust gas. In addition, in order to upgrade the exhaust gas treating capability of the solid metallic oxide, it is preferable to heat the exhaust gas and is preferable to set the heating temperature at 20-40° C.

CLAIMS

[Claim(s)]

[Claim 1]A processing agent of metal halogen exhaust gas which uses a solid metal oxide as the main ingredients.

[Claim 2]The processing agent according to claim 1 as which an element of a solid metal oxide is chosen from Mg, Ca, Ti, Mn, Fe, Co, nickel, Cu, and Zn.

[Claim 3]The processing agent according to claim 1 whose metal halogen exhaust gas is exhaust gas containing metal fluorine gas and/or metal salt matter gas.

[Claim 4]The processing agent according to claim 1 which the main ingredients of a solid metal oxide contain at least 10% of the weight or more.

[Claim 5]The processing agent according to claim 1 which the main ingredients of a solid metal oxide contain 50% of the weight or more.

[Claim 6]The processing agent according to claim 1 which specific surface areas of a solid metal oxide are the particles which are more than 0.1-m^2/g, and molds this by a granulation or/and tableting, and extrusion.

[Claim 7]A disposal method of metal halogen exhaust gas which uses a solid metal oxide as the main ingredients, passes exhaust gas containing metal halogen gas to this solid metal oxide, and is characterized by processing.

[Claim 8]The disposal method according to claim 7 whose temperature at the time of metal halogen exhaust gas passing a solid metal oxide is 20-400 **.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to a processing agent of metal halogen exhaust gas, and a disposal method for the same. It is related with a gassing agent of the dry type which carries out contact treatment of the exhaust gas of organic silane system gas by passing the packed bed of a solid metal oxide in more detail, and a disposal method for the same.

[0002]

[Description of the Prior Art]It is called metal fluoride exhaust gas among special gases for semiconductor process, and especially metal fluoride exhaust gas, such as silicon tetrafluoride, a silicon tetrachloride, germanium tetrafluoride, germanium tetrachloride, and tungsten hexafluoride, attracts attention by demonstrating performance ***** as doping gas.

[0003]However, these most are dealt with as poisonous gas, and if toxicity, such as stimulating a breather violently especially by absorption, is strong and is emitted outside at high concentration, the adverse effect to a human body and natural environment has an unfathomable thing. Therefore, it is the natural duty of those who deal with it that reduction of the metal fluorine gas concentration in the exhaust gas in a

manufacturing process and semiconductor industry works for maintenance of good work environment and prevention of destruction of natural environment.

[0004]Therefore, like other poisonous exhaust gas, before these metal fluoride exhaust gas carries out air discharge, it is necessary to detoxicate it, and the disposal method by a wet type is proposed from the former. The disposal method contacted in water is generally performed, using a backwashing-by-water scrubber as processing by a wet type.

[0005]

[Problem(s) to be Solved by the Invention]However, it is decomposed by water, HF and HCl, a metallic oxide, etc. generate these metal halogen gas, and such secondary treatment is needed. In order that Silang, a disilane, etc. may use it for them, being doped, when the exhaust gas with which a mono silane, a disilane, etc. were mixed with metal halogen gas is processed to the flue gas treatment apparatus of a combustion equation, the problem of damaging the apparatus of a combustion treatment device is also pointed out to it, and it has many practically inconvenient points.

[0006]

[Means for Solving the Problem]Then, in order to obtain a processing agent which can process metal halogen exhaust gas safely efficiently, and a method for the same, as a result of inquiring wholeheartedly, by using a solid metal oxide, this invention persons find out attaining the purpose, and came to complete this invention.

[0007]That is, this invention uses as the main ingredients a processing agent or a solid metal oxide of metal halogen exhaust gas which uses a solid metal oxide as the main ingredients, and it is related with a disposal method of metal halogen exhaust gas passing and processing exhaust gas containing metal halogen gas to this solid metal oxide.

[Detailed description]

[0008]Hereafter, this invention is explained still in detail. An oxide of almost all metallic elements can be used for a solid metal oxide used by this invention. Especially, toxicity is low and MgO, CaO, TiO_2, MnO_2, and Fe_2O_3, CoO, NiO, CuO, ZnO, etc. are easy handling, and since they are comparatively cheap, they are preferred. They can be used as a simple substance or two or more sorts of mixtures.

[0009]This invention carries out aeration processing of the exhaust gas which contains metal halogen exhaust gas in a packed bed which the main ingredients of the aforementioned solid metal oxide contain 50% of the weight or more preferably 10% of the weight or more. Specific surface area of a solid metal oxide to be used has it, when using more than 0.1-m^2/g raises gas-solid contact ability with metal halogen gas.

[desirable]

[0010]It is effective to feed exhaust gas, heating a packed bed, in order to heighten exhaust gas throughput of a solid metal oxide. However, this heating is not necessarily indispensable depending on a processing rate which does not need heating at all depending on a kind of solid metal oxide, but some which can fully achieve the exhaust gas processing capability also in a room temperature have, and is made into concentration of metal halogen exhaust gas which should be processed, or the purpose. Therefore, in this invention, 20-250 ** of 20-400 ** is preferably preferred for temperature of a solid metal oxide. It is not desirable from from [, such as degradation of a processing agent which will be used if it exceeds 400 **, and a loss of energy,].

[0011]In the present chip fabrication factory, since it is moved to down stream processing after diluting

metal halogen gas which remains by a manufacturing process by a lot of N_2 gas, a total amount of exhaust gas will become considerable.

[0012]Although a packed bed may be filled up with powder, since a pressure loss becomes large and a flow of gas worsens, a solid metal oxide has a granulation or a desirable thing which was tableting-molded, and was extruded and molded. Under the present circumstances, about using a binder required for a granulation, and its kind, it does not specify and does not interfere at all in this invention. As a binder used here, inorganic binders, such as organic binders, such as methyl cellulose, methylethylcellulose, and polyvinyl alcohol, water glass, bentonite, etc. can be used.

[0013]A cylindrical thing is generally used for a packed column with usable general-purpose construction material by an elevated temperature at oxide stock, such as metal, such as iron, copper, stainless steel, and nickel, or glass, and alumina. A thing according to a throughput or throughput is used about size of a packed column.

[0014]As for a packed bed for carrying out this invention, it is desirable to make this into two or more parallel systems from operational viewpoints of reproduction, exchange, etc., although one series is also enough, to make each into a treating layer and a reproduction layer, and to use it, switching mutually. Like the above, a treatment effect can be given by carrying out gas-solid contact on the surface of a solid metal oxide.

[0015]

[Example]Hereafter, an example explains still in detail. % and ppm express a capacity standard.

The CuO particles of specific surface area ^{2}[of 58 m]/g are molded into an example 116.5phimmx200mm stainless steel column by a tabletting press, After being filled up with 20 cc of fill rations, WF_6 gas was diluted with gaseous helium to 1%, it aerated to the packed bed by 67 cc/min, and WF_6 gas concentration in packed bed outlet gas was analyzed. Analysis was conducted by the gas chromatograph (Hitachi GC-3000) provided with the photoionization detector (PID). An isolation column uses Porapak-P. As for the result, reduction of WF_6 gas concentration 30 minutes after aeration was checked as shown in Table 1.

[0016]Using the same column as example 2 Example 1, and the gas-chromatograph device, the MgO particles of specific surface area ^{2}[of 0.7 m]/g were molded by the tabletting press, and it was filled up with 20 cc of fill rations. After heating the portion of a packed bed at 200 ** with a heater, it diluted WF_6 gas with gaseous helium to 1%, aerated it to the packed bed by 67 cc/min, and analyzed WF_6 gas concentration in packed bed outlet gas. Analysis was conducted by the gas chromatograph (Hitachi GC-3000) provided with the photoionization detector (PID). An isolation column uses Porapak-P. As for the result, reduction of WF_6 gas concentration 30 minutes after aeration was checked as shown in Table 1.

[0017]It carried out using the same column and gas chromatograph as Example 1 except having changed Example 3 - 12 solid-metal oxide, shape, metal halogen gas, packed bed temperature, and the gas concentration before aeration, as shown in Table 1. A result is using the metallic oxide hung up over Table 1, and reducing the concentration of metal halogen gas was checked.

[0018]CuO of specific surface area ^{2}[of 58 m]/g which molded into the same column as Example 1 the gaseous helium which contained concentration for example 13 monosilane gas and WF_6 gas 1%, respectively by the tabletting press was aerated in this column, after being filled up with 20 cc. The result checked that monosilane gas and WF_6 gas reduced the concentration of gas as shown in Table 1.

[0019]

[Table 1]

実施例	成分	固体金属酸化物			処理ガス中のガス成分	濃度	
		比表面積 (m^2/g)	型状	カラム温度 (℃)		通気前 (%)	通気後 (ppm)
1	CuO	58	タブレット	20	WF_6	1	54
2	MgO	0.7	↑	200	↑	1	16
3	CaO	3.5	↑	100	GeF_4	1	22
4	Fe_2O_3	106	造粒	50	↑	1	5
5	CuO	58	押し出し	400	SiF_4	1	30
6	CuO	74	↑	250	↑	5	76
7	CuO	58	タブレット	200	$SiHF_3$	1	9
8	NiO	43	↑	20	SF_6	1	14
9	ZuO	51	↑	100	$SiCl_4$	1	25
10	CuO	74	↑	200	SiH_2Cl_2	1	27
11	Fe_2O_3	106	↑	350	↑	5	35
12	CuO	74	↑	200	$(CH_3)_3SiCl$	1	22
13	CuO	58	↑	40	WF_6／SiH_4	1／1	51／0.5

[0020]

[Effect of the Invention]As mentioned above, the packed bed of a solid metal oxide is made to pass metal halogen exhaust gas in this invention, as explained in detail.

Therefore, it became possible to process exhaust gas safely efficiently.

The miniaturization of a device can be attained compared with the conventional disposal method.

[Translation done.]